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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,904	07/21/2003	Kenneth E. Welker	2088.002800/14.0246	7670

28116 7590 12/06/2006

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EXAMINER	
HUGHES, SCOTT A	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 12/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/623,904	WELKER ET AL.	
	Examiner	Art Unit	
	Scott A. Hughes	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5,6,18,25,30 and 35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5,6,18,25,30 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/20/2006 has been entered.

Response to Arguments

Applicant argues that the claims are now in condition for allowance, as the claims containing subject matter that was indicated as being allowable in prior Office Actions have been rewritten in independent form. Upon review of the prior art and the claims as amended, it has been determined that the subject matter should not have been indicated as allowable in the prior actions, and that 35 USC 103 rejections of the claims is proper. Any inconvenience to the applicant is regretted.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-6, 18, 30, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen in view of Orban (6353577).

With regard to claim 5, Stephen discloses determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. This change in orientation would be an indication that the cable has moved since its orientation has changed. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic

sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious that the accelerometers in Stephen that sense acceleration due to gravity would therefore produce DC signals since Orban teaches that the accelerations due to gravity sensed by accelerometers are in the form of DC signals.

With regard to claim 6, Stephen discloses that the ocean bottom cable comprises a plurality of orientation sensors coupled thereto (Figs. 1, 2a,b), and that the comparing comprises comparing a plurality of initial orientation values to a plurality of current values of the orientation sensor (Column 2; Column 3, line 60 to Column 4, Line 63).

With regard to claim 18, Stephen discloses at least one ocean bottom cable (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). Stephen discloses at least one seismic sensor 14,15,16 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Line 15 to Column 5, Line 8). Stephen discloses at least one orientation sensor 5,6,7 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Lines 8-63). Stephen discloses a signal processing unit (Column 4, Lines 53-63) capable of determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63) and capable of determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated

by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. This change in orientation would be an indication that the cable has moved since its orientation has changed. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious that the accelerometers in Stephen that sense acceleration due to gravity would therefore produce DC signals since Orban teaches that the accelerations due to gravity sensed by accelerometers are in the form of DC signals.

With regard to claim 30, Stephen discloses an article comprising one or more machine-readable storage media containing instructions that enable a processor to perform a method (described below) (Column 2, Lines 25-65; Column 4, Line 53 to Column 5, Line 5). Stephen discloses determining at least one initial value of at least

one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. This change in orientation would be an indication that the cable has moved since its orientation has changed. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious that the accelerometers in Stephen that sense acceleration due to gravity would

therefore produce DC signals since Orban teaches that the accelerations due to gravity sensed by accelerometers are in the form of DC signals.

With regard to claim 35, Stephen discloses means for determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses means for determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses means for comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that there are means for determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. This change in orientation would be an indication that the cable has moved since its orientation has changed. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the

sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious that the accelerometers in Stephen that sense acceleration due to gravity would therefore produce DC signals since Orban teaches that the accelerations due to gravity sensed by accelerometers are in the form of DC signals.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen in view of Analog Devices (ADXL202E).

With regard to claim 25, Stephen discloses a system for carrying out a seismic survey (abstract; Column 1, Line 65 to Column 2, Line 56). Stephen discloses at least one ocean bottom cable (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). Stephen discloses at least one seismic sensor 14,15,16 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Line 15 to Column 5, Line 8). Stephen discloses at least one orientation sensor 5,6,7 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Lines 8-63). Stephen discloses a signal processing unit (Column 4, Lines 53-63) capable of determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63) and capable of determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and

therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. This change in orientation would be an indication that the cable has moved since its orientation has changed. Stephen discloses that accelerometers are used as the orientation sensors, but does not disclose the specific type of accelerometer used. Stephen does state that the accelerometers can be piezoelectric, piezoresistive, or capacitive accelerometers (Column 5). Analog Devices (ADXL202E, 2000) teaches a capacitative, dual axis accelerometer formed on an integrated circuit chip that can be used to sense accelerations due to gravity (Pages 1, 8-12). It would have been obvious to modify Stephen to include the dual axis accelerometer formed on an integrated circuit chip as taught by Analog Devices as the accelerometers used to sense accelerations due to gravity in order to be able to measure full 360 degrees of orientation through gravity.

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH
12/4/2006

JACK KEITH
SUPERVISORY PATENT EXAMINER